core and the memory, wherein a number of the cell arrays is a multiple of a number of the output pins.

[0024] According to an aspect of another exemplary embodiment, there is provided an image processing apparatus for performing a Fourier transform including: a first core configured to generate intermediate data by performing a one-dimensional fast Fourier transform (1D FFT) on data in a row direction, a memory configured to store the intermediate data in a cell array in the row direction and read out the intermediate data from the cell array in the column direction, and a second core configured to generate final data by performing a 1D FFT on the read-out intermediate data.

[0025] According to an aspect of another exemplary embodiment, there is provided a non-transitory computer readable storage medium having stored thereon a program, which when executed by a computer, performs the above method.

[0026] According to an aspect of another exemplary embodiment, there is provided an apparatus for performing a Fourier transform including: a memory comprising a plurality of cell arrays, at least two cores configured to generate intermediate data by performing a one-dimensional fast Fourier transform (1D FFT) on data, each core performing 1D FFT in different directions, wherein the memory is configured to store the intermediate data in a cell array in a first direction and read out the intermediate data from the cell array in a second direction which is perpendicular to the first direction.

[0027] The memory may store the intermediate data in a column direction and read out the stored intermediate data in a row direction, or the memory may store the intermediate data in a row direction and read out the stored intermediate data in a column direction.

[0028] The memory may include a write driver and a read sense amplifier, and the write driver may store the intermediate data in the cell array by applying a voltage or current to the cell array, and the read sense amplifier may read out the stored intermediate data by measuring resistance of each cell of the cell array by applying a voltage or current to the cell array.

[0029] Each cell of the memory may include two transistors and one magnetic tunnel junction (MTJ) including a free layer, and the intermediate data may be stored in the cell array by changing a spin direction of the free layer of the MTJ, and the intermediate data may be read out from the cell array by measuring a resistance of each cell of the cell array.

[0030] The intermediate data and the memory may be two-dimensional matrix formats, and the intermediate data may be stored in the memory at a position corresponding to a position of each data of the intermediate data.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] The above and/or other aspects will become apparent and more readily appreciated from the following description of the exemplary embodiments, taken in conjunction with the accompanying drawings in which:

[0032] FIG. **1** is a flowchart of a process of processing image data;

[0033] FIG. **2** illustrates a process of transforming data;

[0034] FIG. **3** is a flowchart of a Fourier transform method according to an exemplary embodiment;

[0035] FIG. **4** is a block diagram of an example of an image processing apparatus;

[0036] FIG. **5** illustrates a cell of a memory according to an exemplary embodiment;

[0037] FIG. **6** illustrates a method of wiring data according to an exemplary embodiment;

[0038] FIG. **7** illustrates a method of reading out data according to an exemplary embodiment;

[0039] FIG. **8** illustrates a method of storing data according to an exemplary embodiment; and

[0040] FIG. **9** illustrates a method of storing intermediate data in a cell array.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0041] Reference will now be made in detail to exemplary embodiments, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. Also, the size of each layer illustrated in the drawings may be exaggerated for convenience of explanation and clarity. In this regard, the exemplary embodiments may have different forms and should not be construed as being limited to the descriptions set forth herein. Accordingly, the exemplary embodiments are merely described below, by referring to the figures, to explain aspects of the present description. In a layer structure, when a constituent element is disposed "above" or "on" to another constituent element, the constituent element may be only directly on the other constituent element or above the other constituent elements in a non-contact manner.

[0042] FIG. **1** is a flowchart of a process of processing image data. Referring to FIG. **1**, an image processing apparatus may receive image data and output an image.

[0043] In operation **110**, the image processing apparatus receives image data. For example, in a computer-generated holography (CGH) operation, when a layer-based algorithm is applied to image data, the image data may be color data or depth data. The color data may be data indicating a plurality of colors for each plane. The layer-based algorithm is a method of dividing a reproduction area of a hologram based on a depth and processing data of each divided plane. The image processing apparatus may generate a hologram image by performing the Fourier transform or the inverse Fourier transform on data of each divided plane.

[0044] In operation **120**, the image processing apparatus performs image quality correction and field calculation. The image processing apparatus may correct image data to improve image quality of the image data.

[0045] In operation **130**, the image processing apparatus performs the Fourier transform or the fast Fourier transform (FFT). For example, the image processing apparatus may perform the Fourier transform on image data in a two-dimensional (2D) matrix form. The image processing apparatus may perform a one-dimensional (1D) Fourier transform twice for a 2D Fourier transform. The image processing apparatus may perform a 1D Fourier transform on image data in a row direction and a 1D Fourier transform on the transformed image data in a column direction. The image processing apparatus generates a holographic image through the Fourier transform.

[0046] In operation **140**, the image processing apparatus performs a pixel encoding, and generates data to be input to a screen through the pixel encoding.

[0047] In operation **150**, the image processing apparatus outputs an image to an image display apparatus.